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ABSTRACT

Informal logic, developed in response to the shortcomings of standard introductory college logic courses, stands between formal logic and critical thinking and is consequently subject to two opposing tensions. The first of these tensions concerns analogues to formal principles, context-independent criteria for identifying and assessing arguments. The second demands that informal logicians offer an educational program that is of general utility, enabling students better to assess arguments both in their courses of study and in their everyday lives. Informal logic must move beyond the logical to embrace applied epistemology, the study of the epistemologies in use in the various domains of human understanding, in order to ground the assessment of arguments as they occur in the various domains. This paper is an attempt to move informal logic and critical thinking conceived of as informal logic away from a priorism characteristic of formal logic and towards a methodical and epistemological stance that more adequately reflects the range of practices in knowledge gathering. Informal logic/critical thinking must include awareness and practice in the complexity of arguments embedded in various disciplinary practices. If students are to be helped to think critically they must learn to access relevant information, apply appropriate methodical principles, and look to analyses of issues that reflect the most appropriate methodology in many domains. (IAH)

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Informal Logic and Applied Epistemology

Mark Weinstein

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INFORMAL LOGIC AND APPLIED EPISTEMOLOGY

Mark Weinstein

Recent concern with informal logic begins against the backdrop of the teaching of aspects of symbolic and traditional logic as a standard undergraduate course in philosophy. First level logic courses, with their typical mixture of fallacies, fragments of formal logic, linguistic analysis and rudimentary scientific method were presented to students to accomplish at least two educational objectives. The first of these was to offer them an analysis of argument and the beginning of a method of argument assessment, and the second to offer some foundational knowledge and basic skill in reasoning. The latter objective is based on a vague, but traditional notion that the teaching of logic is relevant to the teaching of thinking. The former was based on the equally venerable notion that argument analysis is relevant to argument assessment and that skill in argument assessment enables students to, in some sense, develop the skills and even dispositions of reasonable persons, traits and abilities now commonly identified with critical thinking.[1].

It was the inability of the then standard introductory logic courses to achieve these ends, and the compelling nature of the ends themselves, that furnished the impetus for informal logic.[2]. Thus, informal logic stands between formal logic on the one hand and critical thinking on the other. And as such informal logic is subject to two opposing tensions. The first of these prompts concern with analogues to formal principles, context independent criteria for identifying and assessing arguments. The second demands that informal logicians offer an educational program that is of general utility, enabling students to better assess arguments both in their courses of study and in their everyday lives.

The logical aspect of the informal logic project has been taken to include an effective theory of argument structure (functionally analogous to syntax in formal systems) through the circle arrow diagrams, now commonly accepted as the most adequate means of representing arguments, and a theory that accounts for the acceptability and unacceptability of arguments (analogous to semantics). The latter has, for the most part, concentrated on fallacies, both traditional and newly defined.

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The model of formal logic and the deeply rooted tendency of philosophically trained informal logicians to search for purely general and, hopefully, a priori principles (or at least principles that require no more than an analysis of language and common sense), has resulted in a predisposition that, as I shall hope to convincingly argue, creates problems for the satisfactory application of informal logic as a tool for critical thinking.

Critical thinking is, whatever else, an educational ideal of great breadth and profundity. It has been identified with reasonableness in general, as in Siegel's definition of the critical thinker as one who is "appropriately moved by reasons."[3] It has also been identified with the most all-embracing notion of the intellectual virtues, as in Ennis' characterization of critical thinking as "reasonable and reflective thinking focused on deciding what to believe or do".[4]

It is this very general objective that, so it seems to me, requires that informal logic move beyond the logical in order to embrace what might be called applied epistemology, that is the study of the epistemologies in use in the various domains of human understanding in order to ground the assessment of arguments as they occur in the various domains.[5] Notice that I am assuming that there are distinguishable domains of human understanding, that the domains of human understanding have epistemologies, and that these need to be made explicit, if informal logic is to lead to critical thinking. Needless to say , my claim is controversial, since, for among other reasons, it implies that pure epistemology is insufficient to the task of critical thinking. That is, I maintain that epistemology that is purely philosophical and independent of the various domains of inquiry cannot effectively result in critical thinking in the broad sense required by the educational ideal sustained in its name.[6] Notice also that this implies that the domains of human understanding are generally relevant for "deciding what to believe or do." I will argue that domain specific knowledge, including knowledge of the epistemologies of domains, is relevant for critical thinking about ordinary affairs, those "real life problems" that have been the focus of much of the theory and practice of informal logic.

The need for an applied epistemology is grounded in the nature of informal logic itself. For if the assessment of arguments is to be seen through the analogy with formal logic, what is required is both a theory of premise acceptability (analogous to say, a Tarskian definition of truth), and some account of how acceptability is transmitted from premises to conclusions (analogous to semantic entailment). On such an account a theory of fallacies shows how various fallacious moves block acceptability from being transmitted through the chain of argument from premises to conclusions. It is important, however, to note an important asymmetry between a theory of

fallacies and a theory of semantic entailment, for the theory of fallacies shows how the chain of argument is broken, not how the chain is validated. The asymmetry is sufficient to account for the attractiveness of deductivism in informal logic, since if all appropriate arguments are deductive, then no semantics other than that of the preservation of truth-like properties is required.

Unfortunately for generalist tendencies in informal logic, the deductivist solution has been generally seen to be unattractive, at least if we mean the sort of deductivism that makes all arguments analytic or nomic entailments.[7] Trudy Govier's careful arguments found most recently in *Problems in Argumentation Analysis and Assessment*,[8] seem compelling when she points out, both by abstract reasoning and persuasive examples, the inappropriateness of the very general universalizations that would be required if deductivism is to be sustained in the contexts of argumentation with which informal logic is most concerned. There is, however, another sense of deductivism that needs to be distinguished from the one just mentioned. That is the notion of deductivism that is parasitic on the minimal conditional. As has been noticed by almost everyone who has discussed the issue, to present premises *p1* through pn and conclusion *q* is to assert at last the material conditional if *p1* and ... and *pn* then *q*. Thus, elementary deductive relations of the sort captured by modes ponens and modes tollens are built into the very fabric of argumentation. In this sense deductive moves are always included in argumentation and the correlative deductive fallacies are always appropriate means of critique. But again, as Govier has argued, the minimal conditional in no way extends the force of the argument beyond the stated premises and thus in no way guarantees the stronger sense of analytic or nomic entailment that is required if the premises are to, non-trivially, imply the conclusion. By non-trivially I mean imply them without the addition of the minimal conditional generated ad hoc.

The unavailability of deductivism has serious consequences for informal logic as a tool for argument assessment. For, as mentioned earlier, the fallacies merely show when arguments fail, and so what is needed is additional apparatus to demonstrate how arguments succeed. This opens the door for what I have called applied epistemology. For I will claim that the assessment of the strength of the support that premises afford conclusions can only be assessed when the domain within which the argument is presented is taken into account. To use a distinction that I owe to Rob Grootendorst,[9] fallacies are norms for argumentation that cannot be violated, if it is to be reasonable, but they do not afford criteria that allow us to assess the degree of success with which a set of premises support a particular conclusion. That is, assessing the success with which premises support conclusions requires, in the words of Kruiger, appeal to a "mutually accepted testing procedure," or a "mutually accepted system of logic,"[10] in my terms, accepted principles of methodology and substantive

generalizations.[11] I will argue further that even the fallacies cannot be fruitfully employed outside of domain specific considerations, for, as I will attempt to show, if only in barest outline, many of the most essential fallacies are themselves parasitic upon standards that are not generally identifiable outside of the domains of discourse within which argumentation takes place. That is, fallacies alone do not enable us to decide what to believe or do, or in Siegel's terms, they are insufficient to determine when we are to be appropriately moved by reasons.[12]

The rejection of a thorough-going deductivism has consequences for the assessment of arguments, for if the relation between premises and conclusion is not deductive, then some sense must be made of the claim that particular premises offer varying support for the conclusion. This can not be accomplished through argument diagramming alone, especially if diagrams are limited to identifying premises and conclusions. But even where diagrams are complicated by a more sophisticated notion of the roles of premises in argumentation, difficulties with levels of support still persist. James Freeman[13] has developed a complex diagramming model, using the functional roles identified by Toulmin, but this will not suffice, for such diagrams tell merely which sentences in an argument play the various roles, not how well they accomplish the task of supporting the claims made.

This can be most easily seen if we accept Toulmin's model as a plausible account of the complex roles of premises in arguments,[14] for as Toulmin himself maintains, the structure of functional roles he identifies is itself dependent on particular methodological principles in the domains within which argumentation occurs. The notion of warrant serves as a telling example. Toulmin sees warrants as sentences that show the relevance of grounds to claims. In science, for example, a warrant might be a covering law showing a functional relationship between data and some predicted outcome.[15] But as many of Toulmin's early critics maintained, data can be challenged in other ways. In particular the data may be relevant in the sense that they are appropriate to some generalization, but the data may themselves be methodologically suspect.[16] The data may be challenged, not only in respect of their relevance, but also as regards their facticity. But, how are such challenges to be distinguished, or rather, how are warrants presented in response to such concerns to be identified? The answer seems obvious to me, such differing warrants can only be identified if substantive knowledge of the domain within which the argument takes place is brought to bear. Further, how are such warrants to be assessed? How do the different considerations render the conclusion more or less worthy of belief? It seems to me that only a sense of the basic epistemological issues in the field could possibly help. How well entrenched are the generalizations, how canonical is the methodology, what latitude is acceptable in practice? Clearly these are domain specific issues, and not merely issues of fact but rather, issues that refer to substantive methodological assumptions that govern inquiry in the domain.

It might be countered that even if Toulmin's model of argument is correct as an analysis of arguments in the stylized contexts of the special disciplines, it is irrelevant to the practice of informal logic in respect of its most essential domain of application; that is ordinary argumentation. I now turn to that concept.

The distinction that the concept of ordinary argumentation was seen to make, sees ordinary arguments in contrast to the argument samples that were frequently presented in logic textbooks. Turning sample arguments into overt and formally expressed implications requires that the argument samples offered be treated as constituted, at least in their essential aspects, by those formal renderings that became the textbook's exercises in derivation and proof. Translation, the rendering of ordinary arguments as formal proofs was thus, a significant component of introductory logic texts. The artificiality of this process led to two separate quasi-deductivist moves, first, the deductivist concern with missing premises as the needed addition to ordinary arguments so as to make them deductively valid, and second, the attempt at alternative reconstruction that held on to procedures that enabled arguments to be assessed holisitically without regard to the strength of individual premises. A characteristic example of this sort is the possible world interpretation that utilizes the notion of a counter example to validity as the core, while relinquishing the details of deductive apparatus.[17].

The difficulty with contrasting ordinary arguments with those in formal languages is that it obscures a more relevant distinction; that is, the distinction between ordinary argumentation, argumentation concerned with so called "real-world" issues, as contrasted with the more stylized argumentation common in specific subject domains. The relation of argument to enhousing domains that had differing and characteristic styles of argument, including specific "inference tickets" (warrants) particular epistemologies (backing) and individual requirements for argument outcomes was argued for most vigorously by Stephen Toulmin.[18].

Toulmin has been heralded, along with Scriven, as one of the founding fathers of informal logic, but his relativization of crucial aspects of argumentation to particular fields of inquiry was unwelcome by many of the leading advocates of informal logic, who, presumably, influenced by the neutrality and a prioricity of formal logic rejected the suggestion that argument analysis required substantive methodological or inferential principles from various domains of inquiry.

The turning point in the regard with which Toulmin's work was held was a review by Ralph Johnson of *Introduction to Reasoning* the textbook that Toulmin co-authored with Rieke and Janik.[19]. Johnson's critique is so all encompassing and so carefully elaborated that Toulmin's position has been less influential then it otherwise might be. For if Toulmin is right, then the issue is not the contrast between ordinary argument and argument articulated through formal languages, but rather the salient differences that distinguish everyday argumentation and argumentation that occurs in the

rather stylized contexts of the various special subject domains.

Johnson's critique of Toulmin asks many of the right questions, showing that many of the most crucial questions relevant to Toulmin's account cannot be answered in the context of the textbook as presented. The basic issue is the identification of sentences in arguments as one of the functional kinds that Toulmin takes as crucial in argument analysis, particularly warrant and backing. In example after example, Johnson supports the same complaint: the short excerpts that Toulmin offers as examples and in exercises are unclear in a variety of regards and in particular, in the very regards that Toulmin takes them to exemplify. That is, warrants are unclear as to the kind of support they afford and are frequently difficult to distinguish from backing. Given his inability to unequivocally identify warrants, Johnson asks the questions that exposes the heart of Toulmin's position: "First, which of the many descriptions of warrant does this example fall under? Second, what field does the warrant belong to?"[20]. It is a crucial question and no answer is forthcoming, for the very nature of the book, the standard use of short examples of discourse, presumable for pedagogical efficiency, precludes that an unambiguous answer be given. But the lack of answer points to the relevance of Toulmin's crucial assumption of the relevance of disciplines to argumentation and the weakness of the standard model of argument analysis that presents fragments of discourse taken out of the context of dispute as the domain of argument analysis, at least in educational contexts. This leads to a deep misconstrual of the issues at hand by an apparently innocuous assumption that Johnson and others seem to make. That is, that argument fragments of the sort that Toulmin, and other logic textbook authors furnish, are unambiguously in a field, if in a field at all.[21].

What the assumption obscures is that there are at least two distinguishable senses in which an argument can be in a field. One sense in which an issue is in a particular field is that an argument, with respect to the issue, is carried out in that field. The argument is, thus, identified in a time and a place and in a discursive community. The other sense in which an argument is in a field is that it includes subject matter and characteristic concepts and argument patterns that identify it as most likely in some field or other, even when it is viewed outside of the specific context of the discussion within which it occurs. It is in this second sense that the field of an argument is difficult to identify, for subject matter and even concepts are common to many fields. And more important, subject matter, and even concepts, can be translated into the practices of many fields, and by doing so, become reinterpreted in ways that include essential concerns relevant to the substance and assessment of argumentation.

That is to say, arguments can be presented and developed in different ways in many fields. Short argument samples, may have been abstracted from discussions in a field (if they are real and substantial) but in the textbook they stand alone. If they are examples representative of a vast number of sample arguments used in texts they are available to many fields.

The most damaging assumption for an informal logic of relevance to critical thinking is to assume that arguments can only be developed and assessed within a particular field, perhaps the growing subdiscipline of philosophy self-identified as informal logic. Arguments can occur framed by many different kinds of considerations. Doubtful claims can be addressed from many disciplinary points of view and many combinations of disciplinary perspectives. The question is, which fields and which approach yields what kinds of success in analyzing and developing the salient aspects of the argument, finally, offering an adequate assessment of the various considerations put forward as arguments in respect of the points at issue.

Robert Ennis, in his seminal paper "Critical Thinking and Subject Specificity: Clarification and Needed Research,"[22]. has conceptualized the idea of domain specifity with characteristic clarity and exhaustiveness. He distinguishes, rightly, the various senses that critical thinking can play in the various domains (fields, disciplines) but everywhere, he sees the issue from the point of view of critical thinking itself. What he, and many other commentators address is the nature of informal logic as a discipline (subdiscipline) itself and critical thinking as a newly bridging specialization within various disciplines (rhetoric, cognitive science, composition theory, and educational psychology, to name obviously relevant points of view).

The problem is the epistemological status of this new endeavor, critical thinking. This has immediate relevance to applied epistemology in my sense. For applied epistemology, as I use it, sees epistemological and methodological normativity in the various special disciplines. That is the emerging discipline of critical thinking is just one approach among many. And although the critical thinking approach speaks to a enterprise shared by the disciplines in general, that is, finding the best in the realm of reasons, critical thinking is but one approach, with an particular methodology, history, current practice and typical domain of concerns.

This seems unacceptable to Siegel whose "good reasons" approach is deeply normative. Epistemologically (and educationally), so Siegel seems to say, critical thinking stands above the various "fields," and therefore is unlimited in its application as a normative tool.[23]. It is for this reason that Siegel believes he has made a point against McPeck's arguments for the dependence of critical thinking on "specific fields or problem areas,"[24]. when he asks him, in respect of the reasons supporting his claim to field dependence: "To what specialized field are these reasons assigned?[25] McPeck however, need not accept that his giving reasons supporting his views on the nature of critical thinking commits him to some summa genus in realms epistemological. For there is a direct and simple answer to Siegel's question: McPeck's comments are within the discipline of Philosophy of Education.

The questions brought up in the discussions of the role of informal logic and critical thinking in argument assessment and especially in educational

contexts are, in the broadest sense, questions in the field of philosophy or perhaps, the philosophy of education, and occur more narrowly within the region in cognitive space that we all share as informal logician or critical thinking specialists.[26] This space is beginning to define a new field, with characteristic organs of publication and dissemination. And at this point the field is represented by primarily philosophical concerns, procedures and methods of assessment. Critical thinking is a classic example of a complex field, slowly become concrete and identifiable as members from many persuasions reach a consensus as to issues, style of argumentation and criteria for assessment. This paper is an attempt to move informal logic and critical thinking conceived of as informal logic, away form the a priorism characteristic of formal logic and towards a methodical and epistemological stance that more adequately reflects the range of practices in knowledge gathering. That is, informal logic must transcend the a priorism inherited from logic and move towards the complexity and diversity of the full range of human understanding.

The question discussed by Ennis and others is invariably: How do various arguments look from the perspective of informal logic/critical thinking? That is: How can various arguments be construed so as to fall under the analytic frameworks available within informal logic/critical thinking? That certainly is an interesting question and addresses the sufficiency of informal logic to offer an analysis of a given issue. But, it does not speak to the necessity, or even the utility of such a perspective, for an equally interesting question is systematically overlooked. That is: How does an analysis offered by informal logicians look from the perspective of other domains within which the argument may be housed as well?[27] This is a manifest concern for equally all-encompassing domains such as sociology, but is also a concern for the more specific domains in which aspects of an argument can be fruitfully elaborated. For identifying and assessing arguments requires, among other things, decisions as to the relevance of argumentation moves and the relative weight assigned to premises offered in support. Clearly these may vary from field to field.[28]

Trudy Govier,[29] with characteristic insight has framed the issue in terms of division of labor. Courses in informal logic do not deal with a particular subject matter, but rather with a particular aspect of subject matters, those concerns that are identified through the practice of informal logicians. Such concerns include considerations of argument structure and the sorts of argumentational moves of which the fallacies are improper instances. That is certainly reasonable. Informal logic deals with the argumentation and not with other aspects of an issue. That does not, however, free the informal logician from the demand to do applied epistemology. Not if I am correct in maintaining that argument assessment requires a determination of the kinds and strength of support that premises give conclusions. For it seems clear to me that this cannot be ascertained short of an analysis of the epistemologies in use in relevant fields.

These issues persist as a concern for many advocates of an essential role for disciplinary knowledge and methodology in informal logic/critical thinking, despite the arguments that attempt to show relevant and useful notions of critical thinking that are generally available for instruction and neutral in respect of the disciplines. The resolution of these issues requires that reflective practitioners of the disciplines, students of the history of ideas, methodologists, and specialists in teaching increasingly engage in the task of generating and organizing the data upon which an informed and adequate notion of critical thinking across the disciplines must be based.

My own research responds to such an agenda. Increasingly, my interest involves working with colleagues from a variety of disciplines attempting to analyze and contrast methods in the various fields, what has been called by John McPeck,[30] and others, the "epistemology of the disciplines." If the locus of critical thinking is to be found in the particulars of disciplinary language and modes of inquiry, then critical thinking, at the undergraduate level at least, will require a focus different from the common concern with topic neutral skills and dispositions. At Montclair State College, some of us are attempting to grapple with the reformulation of the focus of critical thinking through the study of the disciplines in an "ecological perspective."[31] This requires a systematic exploration of the continuities and differences in language and inquiry across the various fields; the relation of particular disciplines to multi-field concerns; and the application of disciplinary knowledge to broad, "real world," problems.

The ecology of the disciplines develops a stance in relation to multi-logical issues. We accept the fact that methods within the disciplines are frequently inadequate to problems that transcend narrow disciplinary frames. But we insist that information drawn from within these frames is necessary if the multi-logical problems are to be addressed in an informed and responsible fashion. Further, we maintain that information from the fields includes substantive methodological principles, principles of epistemological and logical relevance that are drawn from the normatively relevant practices of the disciplines and that are not available in the general characterizations of methodology developed by philosophers working in abstraction from practice. The ecology of the disciplines also includes the perspective that sees epistemological insight to be garnered from the comparison of methodological principles in the various disciplines. This requires the detailed description and assessment of disciplinary practice from the perspective of diverse disciplines. Such a cross-disciplinary perspective certainly includes methodology drawn from the work of philosophers, but philosophy is not uniquely relevant to this study. Philosophers work in specific ways, perhaps in ways that are useful as contrasting points of methodological perspective, but so do sociologists, art historians and chemists. There is no a priori argument that I accept that substantiates the claims of any discipline to methodological priority.

Harvey Siegel[32] has offered such an argument, claiming, in effect, that if such inter-disciplinary contrasts are to be reasonable they must be based

on good reasons, these latter being defined as epistemological in the general philosophical sense. Clearly Siegel is correct in maintaining that inter-disciplinary assessments must be based on good reasons, but it is equally clear that there is no reason to suppose that such standards for assessment must be drawn from philosophical epistemology whether as currently understood or as understood by some future heir of the contemporary philosophical tradition. For, contrary to Siegel, I maintain that it remains to be seen whose methodological practices are best suited to constitute the forum within which cross-disciplinary assesssments are to be made. Historically, philosophers, being concerned with the most abstract principles of inquiry have played the role -- frequently self-appointed -- of court of last resort in methodological disputes. Certainly, the practice of assessing methodology at the highest level of abstraction can be called philosophy with historical and philological warrant. But that is not the issue. The issue, for me, is to identify the domain(s) from which the most adequate methodological concept set is to be drawn. Call the result philosophy if you will: the issue is still from whose practice is epistemological warrant to be drawn. Is the a priori practice of philosophers to be the model, or is it rather the axiomatic practice of mathematicians; is it, perhaps, the theory bound practice of modern physics or rather the inductivist strategies common in the social sciences.

The preceding remarks offer an argument scheme applicable to the vast majority of critical thinking skills identified in lists such as Ennis'.[33] So, for example, whose notion of causal reasoning is most relevant to critical thinking, the historian's, the literary critic's, the quantum physicist's or the educational psychologist's? Or is it rather some philosopher's and if so, which of those available in a rich and varied literature? If we are to judge from classic and contemporary philosophical texts, analyses of causation include a host of related but distinguishable notions. Yet, it is from such analyses that the notion of causal reasoning is to be drawn. Looking at practices in the various disciplines increases the available models for understanding causality. To ask, as do some critical thinking theorists, that students be helped to adjudicate which of various causal claims is most adequate[34] is to require that students be familiar with the various ways that causal claims are grounded in the various domains of inquiry. There just is no univocal analysis of causation that stands as the final court of appeal.[35] The same is true of other central epistemological concepts. Whose notion of observation is most salient to a given multi-logical dispute,[36] the art critic's, the neuro-physiologist's , the cognitive scientist's or the chemist's? What standards for authority are required, the sociologist's, the political scientist's or the theologian's? Whose requirements of clarity should be sustained, the poet's, the bio-chemist's or the geometer's? Such issues, I maintain, can only be joined by contrasting available concepts sets and looking to our epistemological purposes. The various domains of knowledge all have particular insights to offer. These domains include philosophy as a member. Philosophy does not, however, exhaust the available methodological insights, neither through its method nor through its concepts.

The focus I have been describing, an ecological perspective on the disciplines, shifts both the normative and descriptive core of critical thinking. The concern is less with the general concepts of informal logic and more with the concept maps that govern assessment of information in the fields. Most importantly, an ecological approach leaves open the possibility that abstract epistemological arguments drawn from the work of philosophers are not the court of last resort, that successful practice in the various disciplines has normative force, and that critical thinking must be closely tied to sound educational policies consistent with an adequate knowledge base in the various domains.[37]

The view presented here can be criticized on the grounds that the crucial issues of concern to informal logic and critical thinking transcend fields and those cannot be adjudicated in field dependent ways. This seems to me to be clearly wrongheaded. It is true that most real life decisions are hasty and made in ignorance of essential facts and methodological principles, but that is no reason to support such practices in a course that attempts to develop good habits of argument assessment. Real life issues involve a multitude of specialized knowledge, much of which is methodologically diverse. It seems to me that in order to examine such issues critically, what is required is a sense of the variety of information required and a sense of how the varied kinds of information involved can be certified as acceptable.

Perry Weddle uses the choice of toilet tissue as an example of a real decision that is not field dependent.[38] That is an interesting although trivial issue. If a decision of this sort is to be made rationally, if it is important enough to warrant critical thinking, what a wealth of information is needed! Perhaps the issue is health versus cost; well, what do we know of the effect of bleaches in toilet paper, of perfumes? How much should comfort weigh against cost? What percentage of income is required for up-grading toilet paper anyway; how is toilet paper preference related to other, perhaps more expensive indulgences? And what of the environment? What are the facts about the role of toilet tissue in pollution? And, if there are such facts, whose data should be accepted as best representing them? What methodological standards are appropriate to criticize information given by consumer advocates or by toilet paper manufacturers. If toilet paper is worth thinking critically about, it is worth thinking about carefully and well and with a basis in relevant considerations, both factual and methodological. If we are to be appropriately moved by reasons, we must know which reasons count and how much. Argument diagrams and fallacies cannot tell us this. An analysis of the epistemologies in use governing the information presented may very well.

To take a more substantial example, it is certainly relevant to informal logic/critical thinking that students understand the role of appeals to authority in argument, but how can such appeals be reasonably assessed without understanding the various ways that authorities are constituted in

particular domains? Critical thinking textbooks rely on clear examples of fallacious appeals, frequently taken out of context and strongly reliant on the common sense intuitions of students. But are these practices transferable into, say, political disputes? To take a characteristic multi-logical issue: What authorities should be cited in arguing for or against affirmative action as a social policy? Should anthropologists be taken as authorities; psychologists; economists; Supreme Court Judges; all of them, and in what regards? And how is authority defined and validated in these various domains? Further, and more fundamentally, how can students even begin to assess claims to proper authority in such a context without first seeing the relevance of, say, anthropology to the question? Should students be taught to analyze and evaluate such issues through the sorts of argument analysis offered in critical thinking texts, typically free of considerations specific to the various relevant domains, or should they, perhaps, be shown how the various domains are relevant to the issue and what role the various authoritative positions play in understanding the issue? Teaching through the disciplines and across the disciplines might very well be a better way to address multi-logical disputes than the various methods, actual or likely, within the courses characteristic of most of the advocates of critical thinking.[39].

This issue can be seen even more dramatically if we recall our earlier point that critical thinking advocates are themselves professionals in an academic discipline (sub-discipline or multi-disciplinary field). Why do philosophical approaches offer the most relevant perspective on multi-logical issues; why should the practices of informal logicians be central to the resolution of issues that include philosophical concerns as just one aspect among many? Granted, it is philosophers who have raised critical thinking issues as an overt concern, but it does not therefore follow that the concerns raised are best addressed through the characteristic analyses of philosophers as opposed to members of the various other disciplines that might be relevant to particular multi-logical disputes. Granted philosophers may take as their subject matter issues drawn from the various disciplines and inter-disciplinary domains, but that does not entail that their analyses, using philosophical strategies and satisfying criteria for philosophical adequacy, are uniquely relevant to or optimal for the clarification and assessment of responses to such issues. Many other disciplines have over-arching relevance as well, political science, sociology and psychology may very well make similar claims, to name the most obvious alternatives within the context of educational policy. Philosophers can discuss many things, but their discussion is philosophical. The question is not what topics can be discussed philosophically, but rather what topics are best analyzed and assessed within the discourse frames characteristic of philosophers. And this last issue can not be resolved by abstract arguments that show the mere possibility of the application of philosophical criteria to the topics at issue.

This question raises complex analytical and empirical issues. But it cannot be answered by looking at the practice of philosophers alone. Critical thinking ideals require that the practices of all of the domains be examined for their role in achieving the critical ideal. It also requires that the analyses

that critical thinking offer of significant real world multi-logical issues be assessed from the standpoints of the various domains that have something to offer to their resolution. Critical thinking specialists are fond of offering their sorts of problems and their characteristic modes of analysis, thereby showing the relevance of critical thinking to a wide variety of topics. But, how would these topics look if analyzed from the perspective of other domains, either individually or in combination? For the critical thinking advocate to make her point she must offer these sorts of comparative evaluations. It is not enough to point to the possibility of the highest order abstract justifications. Such justifications must be shown relevant to the sorts of concerns that are central to the practice of critical and reasonable education. Philosophy may be needed to evaluate comparative theories at the highest level of methodological generality, but is it appropriate, and to what extent, if we are to satisfy the ideal of critical reflection in the myriad contexts and considerations that constitute educational practice?

One final complaint: The view presented here can be criticized on the grounds that it demands that informal logic include practically everything that students will ever need to learn. And clearly that is a foolish ideal. My position does not demand that students learn everything when they study informal logic/critical thinking, but it requires that students get a sense of what is involved in evaluating arguments. And that does include being sensitive to the substantive and methodological grounds through which claims are warranted. What informal logic/critical thinking must include is awareness, and practice, in the complexity of arguments embedded in various disciplinary practices. Students must be helped to develop a sense of what sort of information is relevant to particular kinds of claims, where the best procedures for warranting such information are to be found and how criticism of such support is to be begun. That is, students must be helped to begin to develop a sense of the role of specialized knowledge in the intelligent adjudication of issues. The alternative, that students rely on their intuitions, the fragmentary knowledge base that they have acquired so far, and a constricted sense of particularly disciplinary practice unrelated to the practices of other disciplinary traditions, tends towards argument assessment through prejudice and ignorance, not through critical intelligence. Even worse, to my mind, is the possibility that students learn argument assessment as conformity with the implicit political or social biases of textbooks or instructors. If students are to be helped to think critically they must learn to access relevant information, apply appropriate methodical principles and look to analyses of issues that reflects the most appropriate methodology in many domains. To rely on structural accounts strengthened by a prioristic assessments of the strength of support, or to countenance the rejection of arguments taken out of context by the assignment of fallacy labels, seems to me to be the very opposite of reasonable and critical thought.

End Notes

1. The idea goes back, of course, to Socrates, Plato and Aristotle. The recent movement relies heavily on the work of Robert Ennis whose initial explication of critical thinking as "the correct assessing of statement," foreshadows what remains at the heart of his conception: a long list of dispositions and abilities, most of which reflect the concerns of informal logic texts (Ennis, 1962, 1987).

2. The story has been told in a number of places. A recent version is by Alex Fisher (1988).

3. Siegel (1988).

4. Ennis (1987).

5. The notion of domains is justifiably viewed with suspicion. The discussion surrounding P.H. Hirst's attempt at distinguishing "forms of knowledge" (Hirst, 1965), a project similar in some respects to my own, included much criticism of the enterprise. Phillipps (1971), for example, pointed up the difficulty of rigorously distinguishing the components of human understanding. If I were to hazard an account of what I mean by "domain" it would be something along the following lines: the criteria needed to identify and distinguish domains involve a weighted function of subject matter and methodology (weighted differently in different cases). This makes life difficult since subject matter areas are not coextensive with domains. For example, some areas of psychology may be seen as closer to quantitative sociology than they are to other areas in psychology; these latter seem closer to literature than they the are to the former. Thus, the college study of psychology will require the study of many "domains."

No matter how the difficulties are ultimately resolved, what a student needs to understand is the information in the courses he or she takes within, what I have come to call, "a nexus of justification and application." On such a view, courses in a particular academic field need to provide their students with a range of the different considerations that support their practice. Such considerations are frequently methodological and metaphysical, as frequently they involve historical and social concerns, and almost always, they involve consideration of the needs of practice, the utility of the field studied, and some sense of how the field yields human understanding.

The range and variety of considerations, even if limited to metaphysical and epistemological concerns, is different within the various academic areas. Psychologists, taken as a class, display a wide range of methodological and metaphysical assumptions; physical chemists appear to exhibit no more than one. But whatever the complexities, all disciplines owe their students an account of why their procedures are deemed best, and

how their procedures appeal to the concerns of humans in their quest for understanding, viewed both historically in the development of a field and in relation to contemporary needs.

How to make a case for the relevance of disciplines seen as domains of understanding? I rely heavily on the force of examples. There are, however, two problems in arguing through examples. The first is the Plato-like demand for general descriptors. I prefer the Wittgensteinian mode, since a general argument is subject to a philosophical analysis in terms of necessity and sufficiency. This, I maintain, often obscures more than it illuminates. Rather than necessity or sufficiency, I prefer the identification of a salient common core of similarities and differences, an interesting "family resemblance" that is prevasive (even if not universal), and useful (even if not adequate for all possible needs). The second problem is based on the realization that examples prove nothing, since apparent differences do not guarantee essential difference. But on whom is the burden of proof? My examples are intended to, among other things, shift the burden onto those who would disregard apparently crucial differences, and instead, point up continuities that are assumed to be illuminating for the understanding of inquiry.

Here are the sorts of examples, posed as questions, that press me in arguing for the discipline specificity of key epistemological concepts: How is the adequacy of a causal account assessed in literature as opposed to chemistry? What counts as an adequate observation of DNA through an electron microscope, as contrasted with an observation made by a historian? What standards of rigor are required in laying out first principles, a geometer's or an economist's? Whose standards for deduction apply to the arguments of a mathematical physicist, to those of an economist? How do inductions differ in a domain the studies uniform natural kinds, e.g. geology, from inductions in a domain such as social psychology? How is statistics employed in quantum mechanics, in population genetics, in educational psychology? (They all satisfy the axioms of probability, but what ice does that cut?) How does narrative support analysis in literature, seen in contrast with case-study analysis in the social sciences, or to philosophical narratives? And how do such narratives contrast with technical papers in an engineering science, or with research reports in quantitative social science, or with reports of experimental findings in molecular biology, or with published results in mathematics?

What is the point of these examples? People in different fields receive, present, analyze and assess information in widely different ways; and these differences are relevant to our students' understanding of the subject-matter materials put before them. Critical thinking, and the assessment of arguments, for which informal logic is deemed relevant, must permit students to see the subjects that they study as responsibly based on warrants, and see the warrants as appropriately backed by the historical dialectic reflected in the methodology of the various fields. Information must also be presented so that its relevance to the domain of its application is

apparent, and so that the goodness of fit (as well as strategies for adjustment) between principles and applications can be identified and assessed.

One more word on the subject. I have no quarrel with a view such as the one put forward by Richard Paul when he asserts that the world, as weli as our conceptual schemes, "can be classified in indefinitely many ways" (Paul, 1985, p. 40). Rather, I would claim that there are classifications of the world, and of the domains of human understanding, that are optimal for critical thinking conceived of as applied epistemology. A major thrust of this paper is that informal logicians and critical thinking advocates should begin paying more attention to what such a task requires.

6. My claim may contend with a strawman alone. Perhaps pure epistemology is no one's cup of tea, although Harvey Siegel, in Siegel(1980) and elsewhere, argues against "naturalistic" accounts of epistemology, and for the irrelevance of social science to the essentially normative tasks towards which philosophical epistemology has traditionally been concerned. But, independent of such arguments, some clarification of my view is required. Judgments of the relevance of purely philosophical epistemology to critical thinking await an account of my phrase "purely philosophical epistemology," and some sense of how my demand that epistemology "effectively result in critical thinking in the broad sense required by the educational ideal sustained in its name," is to be fleshed out. Failing a theoretic analysis of what I have in mind, which will not be offered here, a crucial question and a few examples will, perhaps, serve to indicate the direction in which I am heading.

Ask yourself: What role do the following classic philosophical positions have to play in critical thinking across the disciplines and in relation to meaningful applications of critical thinking in ordinary life (substitute your own list, if you will; but the rhetorical thrust requires that it be an actual list with real candidates): sense data theory; modern discussions of the Gettier counter-example; Humean empiricism; Cartesian rationalism; Plato's doctrine of reminiscence; Aristotle's discussion of the role of experience in supporting general claims; Positivism? Which of these traditional accounts help students to understand their education and their lives, and to what extent? Would combining them help? How much, of which of these, should be taught in critical thinking courses, and in place of what? How do these interface with critical thinking as standardly conceived? What is the relation of these philosophical positions to the methodological core of the other courses that students take?

7. If deductivism is not to reduce to the trivial conditional (see immediately below in the text), some sense of the strength premises afford a conclusion must be forthcoming. This requires that the relation between premises and conclusions is analyzed in more than purely truth functional terms; that is, the internal connections between terms in an argument must be made clear. This, so it seems to me, is information only available from within the

domains of particular disciplines. We do not, after all, get knowledge written in some ideal language composed of primitive predicates and logical connectives, and even if we did, there is no uniform account of the implication relations required. Arguments in the various disciplines do not come complete with their associated Ramsey sentences and a theory of implication, and neither do arguments in ordinary language.

8. Govier (1988).

9. The position is to be found in Grootendorst (1989) read at the Third International Symposium on Informal Logic (TISIL) in Windsor, 1989. He shared it with me in private conversation.

10. Kruiger (1989) read at TISIL. It appears in the program as "The Elevation of Subordinative Argumentation."

11. An idea of what I have in mind here may be found in my remarks on language in the disciplines (Weinstein, 1989a). Methodology is sustained by language in a broad sense that includes both practices and maxims. Both of these aspects of language are internalized when learning a field "from the inside." It is my contention that students should be helped towards explicit knowledge of such methodological particulars as they learn discipline-bound information in schools.

As far as the phrase "substantive generalizations" is concerned, think of the role of laws in physics expressed as differential equations. They tell us the relationships between entities, but they also limit the available descriptions of data and the acceptable manipulations. They, in addition, point to areas of connection and analogy with related issues from both within and outside of the initial domain of inquiry. Knowledge that is built right into the equations limits what and how we can say and do things in the field. Therefore the term "substantive generalizations."

12. See McPeck (1989) for a carefully elaborated argument in support of a similar point.

13. Freeman (1988).

14. Toulmin (1969); Toulmin, et. al. (1979).

15. Using Toulmin to make my point is question begging enough to give me pause. Toulmin is, admittedly, the philosopher in the informal logic movement who best represents the sorts of concern with the disciplines that I advocate. But, although that gives my position little enough support, something else does. Toulmin is also, the individual who has offered the most detailed account of argument analysis to date, this last especially, if you permit me to beg the question once again, by pointing to Toulmin's historical works that outline the course of argument using actual cases from the history of science (Toulmin and Goodfield, 1961, 1963, 1965). What I

see in the disciplines, and find reflected in Toulmin's historical work, are arguments of considerable complexity, arguments that are invariably sensitive to the methodological context and the particulars of the problem situation at a time. If what is required is an account adequate to the phenomena, Toulmin is the most likely candidate in a field of one, He is not only complex, but thoughtful, a student of the history of science, and a philosopher of insight.

Moreover, Toulmin's model of argument analysis has proved invaluable to me in faculty development workshops with teachers of writing and with reading specialists, with social scientists and historians, physical scientists and teachers of the applied arts and sciences. (For one such experience see Weinstein (1989b). The newsletter, *Inquiry: Critical Thinking Across the Disciplines*, contains an ongoing record of workshops with Montclair State College faculty, the overwhelming majority of which use aspects of Toulmin's account.)

The testimony is clear to me; Toulmin's framework speaks directly to faculty and to their discipline-centered understanding. His model makes connection with how faculty see their disciplines, and through its use, they can appreciate what I am up to as a critical thinking advocate working within the context of undergraduate education. In addition, my own attempts to offer an analysis of scientific argument finds Toulmin's structure to be an illuminating perspective and an invaluable tool (Weinstein, 1990).

16. Manicus (1966).

17. Nolt (1984).

18. Toulmin (1969); Toulmin, et. al. (1979). The term "inference ticket" is Gilbert Ryle's (Ryle, 1949, p. 121). The most elaborate use of the term is, however, found in Toulmin (1953, chapter 3).

19. Johnson (1981).

20. Johnson (1981), p. 22.

21. Ennis (1989), p. 6 and p. 8. See also Paul (1985).

22. Ennis (1989),

23. Siegel (1988), pp. 32ff.

24. McPeck (1981). See, for example, p. 13

25. Siegel (1988), p. 148-9, f.n. 69.

26. Notice that the notion of cognitive space is both undefined and certainly fuzzy at the edges, but that does not stop it from having an interesting

topography and even a plate tectonics. See, Weinstein (1988b) for an attempt at tracing the cognitive space of philosophy seen within the context of critical thinking.

27. This leads to equally vital questions, if we are to speak seriously of education: How does the argument analysis of informal logic or critical thinking look from the perspectives of the various school subjects through which we attempt to inform students, or remediate their cognitive deficits, or clarify issues, or support cogent reasoning? How does the practice of informal logic look within subjects that have their own standard for the presentation and the elaboration of argumentation, and especially for assessing students' ability to understand and manipulate argumentation appropriate to the subject area the student is called on to master?

28. Weinstein (1989a).

29. Govier (1985) pp. 237ff. Also see Siegel (1980), pp. 21-22.

30. McPeck (1981).

31. Weinstein (1988b).

32. Siegel (1988). See also, his (1980).

33. Ennis (1987).

34. Robert Swartz and David Perkins (1989), in an extremely useful book that speaks to teachers at all educational levels, offer a "Map of Causal Explanation." It consists of four question that are intended to direct inquiry: "1.What are the possible causes of the event in question? 2. What could you find that would count for and against the likelihood of these possibilities? 3. What evidence do you already have, or have you gathered that is relevant to determining the cause? 4. What possibility is rendered most likely, based on the evidence?" (p. 77). What is clear to me is that it is, in general, impossible to answer these questions without substantive knowledge from domains within which a given causal explanation is offered. By substantive knowledge I don't only mean "facts," but also principles that determine what sort of weight is to be assigned to the considerations that support a given causal claim, and, in addition, the principles that support the strength and reliability of the assignment of the weights themselves.

Kahane (1979) offers a similarly schematic account that raises similar issues. He says, the fallacy label "Questionable Cause" is to be assigned, "if we label a given thing as the cause of something else on the basis of insufficient or inappropriate evidence" Again, I feel an overwhemling need to touch methodological ground. By what criteria are kinds of evidence deemed insufficient or inappropriate? Is there a useful general account of such criteria? And if not, where but into the disciplines are we to go for our answer? And, so it seems to me, that it is only within the various domains of

inquiry that relevant alternatives can be identified, their adequacy relevantly assessed, and judgments of insufficiency and inappropriateness made.

35. It is reasonable to complain that the open-textured examples of analyses of causation by informal logicians and critical thinking specialists that I choose in footnote 34, unfairly represents the analyses available in the current literature. Kahane, who I cite above, spends only two pages on the causal fallacy, whereas Johnson and Blair (1983) spend ten, and Govier (1985) spends perhaps as many as four of her chapters on factors relevant to causal claims. These authors offer rich and complex argument types and patterns, and relevant distinctions for their students to consider. But we may ask: What characteristic limits do these analyses and examples include? Are they, for example, relevant across the disciplines students learn within the courses they take in their undergraduate education?

Johnson and Blair, as is their practice, draw examples from complex causal issues in daily life. Two questions arise: First, can the structures they identify illuminate issues within the disciplines and second, can issues of the type they present be adequately assessed without disciplinary knowledge at some appropriate level of sophistication. (See below in the text, a, hopefully, provocative analysis of a light-hearted example of Perry Weddle's.)

Govier's text is strong on causal arguments. The chapter in which she deals specifically with causal issues connects them to "social life" and so the examples include social science issues, when they do not reflect "daily life." This, to me, is a step in the right direction; her terminology reflects central issues in the domain she explores, e.g. correlation, and her questions, exercises and examples reflect social knowledge at a degree of sophistication that is rightly required of college undergraduates. Her choice of topic is, however, telling. She chooses only one topic (social life) among many relevant to causal analysis; further, she chooses a topic that is rich in its relevance to many ordinary concerns, and is thereby likely to activate students' prior knowledge and prompt additional research. This raises two questions: First, how much knowledge of facts, of appropriate theories and of method, above and beyond the informal logic structures she provides, is smuggled into a classroom discussion or homework assignment that would be adequate to the phenomena presented for analysis and assessment? Second, would similar exercises from the wide range of areas students study in college be as available to their untutored analysis? This raises the issue of division of labor discussed reflected in the text above (p. 13). To what extent do critical thinking outcomes require that informal logic be a mere beginning to a process that must continue throughout many, if not all, of the courses students take. And if such an outcome is required, what is the role that critical thinking advocate and informal logicians must play in institutional reform at the undergraduate level at least. (See, f.n. 37 & 39.)

36. The term "multi-logical" is used by Richard Paul to distinguish those issues that require a variety of perspectives for their analysis and assessment, as contrasted to issues that can be adequately dealt with within

a particular framework. Multi-logical issues, he maintains, are those most essential to a critical thinking perspective. (See his now classic paper, Paul, 1982.)

37. Such a focus has an additional yield in the institutional contexts within which we strive. It makes critical thinking across the disciplines a central concern of the entire educational community and affords an invitation to practitioners of all the area studies to join with philosophers in the epistemological enterprise. Most importantly, for educational reform, it offers a framework for the totality of college studies that requires synthesis and significance, flexibility and creativity. Such a framework can offer the real possibility of educational reform since it gives credence to the entire range of methodological alternative, is open to the pedagogical demands of the various fields, and welcomes all members of the college community as equal participants in the task at hand. If we admit the relevance of higher education for the larger objectives for which the reasonable life is deemed best, such an approach equips our students for their lives as citizens, as decision makers and as rational persons, for it is no less than equipping our students with what seems best in the realm of reasons as the warrants for their judgments.

38. Weddle (1984).

39. I share the concern expressed by Paul, that undergraduate students not be taught to be narrow specialists, "or think that real problems are completely resolvable by specialized knowledge," or feel that they have to "suspend judgment and/or defer to experts" (Paul, 1985, pp. 40ff.). Where we may differ is in regard to the desirability of what Paul disparagingly calls "specialists on specialists," and the educational devices required if students are to become persons who can access and meaningfully employ specialists' knowledge. I also may differ with Paul on the role that I assign to specialists' knowledge, for I see special knowledge within the disciplines as offering the best available knowledge of those aspects of the world that fall within their domain of expertise. (This, of course, includes the special knowledge of philosophers, informal logicians and critical thinking theorists). And so I see a major task of critical thinking to help students understand that special knowledge is required, what aspects of complex problems are amenable to which special knowledge, and how best to assess the claims of specialists, both in terms of appropriate criteria in relevant fields, and in terms of the context of application. If we add to this, that students begin the process of understanding the appropriate criteria for choosing between claims, and that students can understand and apply the criteriological considerations that support them, both by drawing from particular fields and from neighboring fields, including broadly relevant fields such as philosophy and informal logic, we have a definition of critical thinking that I believe is potentially effective both for moving the ideal of critical thinking forward and for understanding the role of informal logic within that general enterprise. Such a definition is, by now, well known to readers of the publications of the Institute for Critical Thinking at Montclair State College:

Critical thinking is skillful, reflective thinking that is conducive to judgment, that is reliant on criteria, is self-correcting, and is sensitive to context (Lipman, 1988).

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